

REMARKS

Reconsideration of the present application, as amended, is respectfully requested

I. STATUS OF THE CLAIMS

Claims 1, 2, 5-8, 12, 13, 16-19, 22-23 and 26 are pending in this application. Claims 1, 12, 19 and 23 have been amended to further clarify that "...the Ni-based metal layer comprised of the nickel alloy for silicide is a nickel alloy layer including greater than 0 to about 20 % of one of Ta, Zr, Ti, Hf, W, Co, Pt, Pd, V, Nb, or any combination thereof". In addition, claim 26 has been amended to correct the dependency of this claim. Moreover, new claims 27-30 have been added.

Support for the above amendments and new claims may be found throughout the specification as originally filed. No new matter has been added by virtue of this amendment.

II. Claim Objections

Claim 26 has been objected to on the grounds that the dependency of this claim is incorrect.

As noted above, claim 26 has been amended to correct the dependency of this claim.

III. Claim Rejections under 35 U.S.C. §103

(i) Claims 1, 5-6, 12 and 16-17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,196,360 to Doan et al (hereinafter Doan) in combination with U.S. Patent No. 5,766,997 to Takeuchi (hereinafter Takeuchi).

(ii) Claims 2, 7-8, 13, 18-19, 22-23 and 26 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the combination of Doan with Takeuchi as applied to claims 1, 5-6, 12, and 16-17 above, and further in view of U.S. Patent No. 6,503,840B2 to Catabay et al (hereinafter Catabay), U.S. Patent No. 6,664,166 B1 to Jaiswal et al (hereinafter Jaiswal) and U.S. Patent No. 6,775,046 B2 to Hill et al (hereinafter Hill).

In response, it is respectfully asserted that the Doan, Takeuchi, Catabay, Jaiswal and Hill references each fail to teach or suggest all of the features recited in independent method claims 1, 12, 19 and 23 of the presently claimed invention.

As mentioned above, claims 1, 12, 19 and 23 have been amended to further clarify that "...the Ni-based metal layer comprised of the nickel alloy for silicide is a nickel alloy layer including greater than 0 to about 20 % of one of Ta, Zr, Ti, Hf, W, Co, Pt, Pd, V, Nb, or any combination thereof".

In particular, Doan and Takeuchi at the very least fail to teach or suggest a method of fabricating a semiconductor device, which includes a Ni-based metal layer comprised of a nickel alloy for silicide which is a nickel alloy layer including greater than 0 to about 20 % of one of Ta, Zr, Ti, Hf, W, Co, Pt, Pd, V, Nb, or any combination thereof", as essentially recited in claims 1, 12, 19 and 23.

Takeuchi fails to explicitly disclose a metal layer for silicide which may be formed of a nickel alloy layer. The Examiner appears to have interpreted the statement in Takeuchi (see column 7, lines 30-37 of Takeuchi) where it is mentioned that its first metal layer 41 for forming silicide can be formed of "...at least one kind of metal selected from a group tungsten (W), cobalt (Co), titanium (Ti) and nickel (Ni)." as also teaching the use of nickel alloys in forming its first metal layer. (See also pages 3 and 4 of the instant Office Action).

Applicants respectfully disagree with the above interpretation by the Examiner. It is submitted that the Takeuchi reference does not explicitly mention using a "nickel alloy layer" as its first metal layer for silicide anywhere in the reference, as required by claims 1, 12, 19 and 23. In fact, Takeuchi fails to explicitly mention using any alloy layers for silicide, altogether, let alone a nickel alloy layer. Takeuchi simply describes that metals such as tungsten (W), cobalt (Co), titanium (Ti) and nickel (Ni) may be used in forming the first metal layer, but fails to expressly teach that these metals may be combined to form a nickel alloy layer.

Rather, Takeuchi teachings appear directed to using pure metals to form its metal layer for silicide. As is well known in the field of metallurgy, the nickel alloy recited in claims 1, 12, 19 and 23 of the presently claimed invention is quite different from the pure nickel described in Takeuchi. If Takeuchi had intended to also encompass metal alloy layers for silicide, then the Takeuchi reference would have certainly expressly said so due to the significant differences between metal alloy layers and to other types of metal layers in terms of their physical, chemical and electrical properties and reactivities. Moreover, the Examiner appears to have interpreted the expression in Takeuchi of "...at least one kind of metal selected from a group tungsten (W), cobalt (Co), titanium (Ti) and nickel (Ni)" as definitively teaching the forming of a nickel alloy layer for silicide. However, this interpretation is erroneous because as is well known in the art, metal layers may be formed using more than one type of metal in the same metal layer without that metal layer being a metal alloy layer.

In sum, Takeuchi only provides a very limited general description of how its first metal layer for silicide is formed without expressly mentioning forming a nickel metal alloy layer. Consequently, at the very least, due to (i) the many different possible ways in which there are to prepare a metal layer for silicide, (ii) the vast differences in properties/reactivity of pure metals as compared to metal alloy layers and (iii) Takeuchi's failure to teach or suggest the desirability of choosing to specifically form a nickel alloy layer, the teachings of Takeuchi are thus insufficient for providing one skilled in the art with the requisite motivation or guidance for forming a metal layer for silicide which comprises a nickel alloy layer, as essentially recited in claims 1, 12, 19 and 23.

Furthermore, beside failing to teach or suggest a metal layer for silicide which comprises a nickel alloy, the Doan and Takeuchi reference also at the very least fail to teach or suggest the specific amounts (e.g. greater than 0 to about 20 %) for the metal constituents of the nickel alloy layer as essentially recited in claims 1, 12, 19 and 23.

Moreover, the Catabay, Jaiswal and Hill references each fail to cure the above noted deficiencies of the Doan and Takeuchi references because the Catabay, Jaiswal and Hill references also at the very least fail to teach or suggest a method of fabricating a semiconductor device, which includes a Ni-based metal layer comprised of a nickel alloy for silicide which is a nickel alloy layer including greater than 0 to about 20 % of one of Ta, Zr, Ti, Hf, W, Co, Pt, Pd, V, Nb, or any combination thereof", as essentially recited in claims 1, 12, 19 and 23.

Therefore, for at least the reasons set forth above, removal of the rejections to claims 1, 12, 19 and 23 is respectfully requested. As claims 2 and 5-8 depend from and incorporate all of the limitations of claim 1, claims 13 and 16-18 depend from and incorporate all of the limitations of claim 12, claim 22 depends from and incorporate all of the limitations of claim 19, and claim 26 depends from and incorporate all of the limitations of claim 23, withdrawal of the rejections to these dependent claims is likewise respectfully requested. Moreover, as new claims 27-30 depend from and incorporate all of the limitations of claim 1, 12, 19 and 23, respectively, these dependent claims are likewise patentable over the Doan, Takeuchi, Catabay, Jaiswal and Hill for at least the reasons set forth above.

In addition to the reasons mentioned above, new claims 27-30 are even further distinguishable over the Doan, Takeuchi, Catabay, Jaiswal and Hill references for at least the following reasons. For instance, Doan, Takeuchi, Catabay, Jaiswal and Hill references each at the very least fail to teach or suggest a method of fabricating a semiconductor device, wherein the nickel alloy layer includes greater than 0 to about 20 % of one of Ta, Zr, Ti, Hf, Pt, Pd, V, Nb, or any combination thereof, as essentially recited in claims 27-30. In particular, Takeuchi is completely silent regarding using any of the following possible metal constituents Ta, Zr, Hf, Pt, Pd, V, Nb as part of a nickel alloy layer as essentially recited in claims 27-30. Furthermore, as discussed, Takeuchi is also completely silent regarding the specific amounts (e.g. percentages) for any of the metals it discusses for forming the first metal layer 41 for silicide.

Moreover, it would not have been obvious to one skilled in the art to provide the specific constituents of the nickel alloy layer in the specific amounts as recited in claims 27-30 because for one, it is a well established fact in the field of U.S. patent law that the chemical art is an

unpredictable art. (See *in re Marzocchi*, 439 F.2d 220, 223-24, 169 USPQ 367, 368-70 (CCPA 1971) and 2164.03 of the MPEP). Even the slightest change in the chemical reactants used and/or the amounts used for the reactants may significantly alter the chemical properties and reactive properties desired. Therefore, due to the unpredictability of chemical art. it would not have been obvious to one skilled in the art to provide a nickel alloy layer including the specific constituents in the specific amounts as recited in claims 27-30 with a reasonable expectation of success. In addition, with all of the different possible ways for forming a metal layer for silicide and the fact that none of Doan, Takeuchi, Catabay, Jaiswal and Hill hints or suggests at the desirability of forming a nickel alloy layer including the specific constituents in the specific amounts as recited in claims 27-30, the teachings of Doan, Takeuchi, Catabay, Jaiswal and Hill references thus also fail to provide sufficient motivation to one skilled in the art for forming the specific nickel alloy layer recited in these claims.

Accordingly, for at least the reasons set forth above, claims 27-30 are patentable over the Doan, Takeuchi, Catabay, Jaiswal and Hill references alone or in combination.

IV. CONCLUSION

For the foregoing reasons, applicants respectfully submit that the instant application is in condition for allowance. Early notice to that end is earnestly solicited.

If a telephone conference would be of assistance in furthering prosecution of the subject application, applicants request that the undersigned be contacted at the number below.

Respectfully submitted,



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